

REMARKS

Claims 1 – 5 have been amended to improve the readability of the claim language.

In response to the Examiner's request for drawings showing every feature of the invention specified in the claims, Applicants submit proposed Figures 3a, 3b, and 4. These drawings add no new matter and only depict elements expressly or inherently described in the specification as filed.

The abstract and the specification have been amended as requested by the Examiner. Several paragraphs have been amended to incorporate reference numbers for features of the invention not previously shown in a drawing. The "Brief Description of the Drawings" section has also been amended to reflect new Figures 3(a), 3(b), and 4.

With regard to the second full paragraph on page 8, the phrase beginning with "which results in removal..." has been added to improve the clarity of the description of figure 3(a). Support for this phrase is found within the Summary of the Invention in the first full paragraph on page 5.

With regard to the addition of "by detecting scattered light 415 generated by light source 410 with detector 420" at the end of the third full paragraph on page 8, those of skill in the art understand that a light scattering type particle inspection apparatus operates by using a light source to generate a light signal, impinging the light signal on an object, and detecting scattered light from the object with a detector.

The Office Action listed several claim terms that required depiction in a drawing. The terms "mirror surface wafer," "natural oxide film," "surface

defects,” “pits and projections,” “epitaxial layer,” “hydrogen atmosphere,” and “light scattering particle inspection apparatus” are now explicitly shown. The term “epitaxial growth” is depicted in the difference between Figures 3a and 3b, as Figure 3b shows a newly formed epitaxial layer. The term “silicon wafer” is depicted by the “mirror surface wafer”, which is a type of silicon wafer. The term “surface state of the silicon wafer” is supported by the combination of Figures 3a and 3b, as the surface defects in Figure 3a are retained in Figure 3b.

The rejection of claims 1 – 5 under 35 USC 102(e) over Sato, US Patent 6,413,874 is respectfully traversed. The claimed invention provides a silicon inspection wafer where the natural oxide has been removed without eliminating surface defects so that a subsequently grown epitaxial layer will exhibit characteristics based on these defects. As disclosed in the specification, this requires a process that removes the natural oxide without causing significant etching of the silicon layer.

By contrast, Sato provides a method for etching semiconductor articles having a silicon film where a “counter-surface” is placed in close proximity to the semiconductor article to improve the etch rate. In particular, one of the objects of Sato is to provide “a method and apparatus for etching a semiconductor article at low cost adapted to obtaining a desired film thickness and a surface condition substantially free from surface defects as well as to a method of preparing a semiconductor article by using such a method and such an apparatus.” (Col. 5, lines 5 – 10) Applicants note that the Office Action cites this passage as evidence that Sato is used for the detection of defects. However, this passage describes

the elimination of surface defects by etching silicon rather than enabling the detection of such defects.

To achieve the above stated objective, Sato discloses a method for treating silicon surfaces where between 10 nm and 200 nm of silicon are etched, and thus surface defects are eliminated. (Col 8, line 63 – Col 9, line 3.) Sato does disclose exposing the semiconductor wafer to a hydrogen-containing atmosphere at a temperature ranging anywhere from 300 °C to the melting point of silicon. However, in the same paragraph Sato also notes that longer etch times should be used if the smoothing (etching) process is proceeding too slowly. (Col. 7, lines 42 – 57) Sato does not describe or suggest a process where a wafer is etched only long enough to remove oxide on the surface without significant additional etching of the underlying silicon. As a result, Sato does not describe an oxide removal process that also retains the surface defects present in the underlying silicon.

With regard to epitaxial growth, the Office Action notes that epitaxial growth is mentioned at Col 1, line 34 of Sato. This section of Sato describes the formation of semiconductor-on-insulator substrates. These substrates are prepared by a) oxidizing a silicon surface, b) etching a window in the resulting silicon oxide, and c) using the resulting exposed silicon window as a seed for growing an epitaxial silicon layer. This section of Sato gives no indication that the oxide layer is removed by a process that retains any surface defects in the underlying silicon. Furthermore, Sato gives no indication that the resulting epitaxial layer has pits and projections that correspond to such surface defects.

Also, all of the epitaxial growth processes described in Sato occur at 1100 °C, which is outside of the range of the claimed invention in claims 3 and 5.

For the above reasons, Sato fails to describe an inspection object silicon wafer that has all of the features of the claimed invention. In particular, Sato does not describe a wafer where the natural oxide has been removed without eliminating surface defects in the underlying silicon, as required by the claimed invention. Because Sato does not describe such a wafer, Sato also does not describe growth of an epitaxial layer having pits and projections corresponding to the retained surface defects.

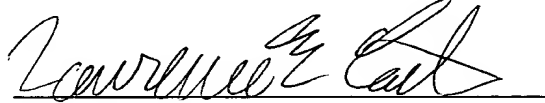
In view of the foregoing amendments and remarks, the application is respectfully submitted to be in condition for allowance, and prompt, favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #029368.50324US).

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Respectfully submitted,

A handwritten signature in dark ink, appearing to read "J. D. Evans", written over a horizontal line.

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IN THE DRAWINGS

Please add the attached new Figures 3a, 3b, and 4. These drawings add no new matter. These drawings are provided in response to the Examiner's request for drawings displaying all of the features of the claimed invention in accordance with 37 CFR 1.83(a).

Attachments:

Drawing sheet for FIGS 3(a) and 3(b)

Drawing sheet for FIG 4